

REMARKS

Claims 15-67 are pending and stand rejected. Claims 15-67 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,215,496 to Szeliski et al., hereinafter "Szeliski," in view of Bastos "Increased Photorealism for Interactive Architectural Walkthroughs," hereinafter "Bastos." Applicant respectfully traverses the grounds for rejection and requests reconsideration and withdrawal of the rejections of claims 15-67 in view of the following.

Rejections under 35 U.S.C. § 103(a)

Independent claims 15, 32, and 49 include features that are neither disclosed nor suggested by the cited references, either taken alone or in combination, namely as represented by claim 15:

15. (Currently Amended) A method for rendering an object having light reflective properties, the method comprising:

determining a destination viewing vector for rendering the object from a destination viewpoint;

*determining a set of source radiance environment maps each having an associated source viewing vector, each source viewing vector representing a different viewpoint associated with the source radiance environment map, each source radiance environment map including information indicative of a light reflective property of the object and comprising texels that each represent a **pre-integrated value of total reflected radiance**;*

warping each source radiance environment map of the set of source radiance environment maps based on the destination viewing vector and the source viewing vector associated with the source radiance environment map; and

blending the warped source radiance environment maps to create a destination radiance environment map. (emphasis added)

The claims are directed to a novel technique for rendering an object whose surface has light reflective properties. Conventional rendering of such objects is performed with integration of the lighting equation for each frame rendered. Integration of the lighting equation is highly processor intensive and therefore, not conducive to interactive rendering (application as originally filed at page 2, line 1 through page 4, line 4). The invention overcomes the need for *integrating the lighting equation* or for performing other integrations for each display frame by starting with a set of source radiance environment maps having

pre-integrated total reflected radiance values. In this manner, an object whose surface has light reflective properties can be more quickly rendered (although possibly with some small loss in accuracy).

Szeliski does *not* disclose or suggest source radiance environment maps that include values representative of pre-integrated total reflected radiance, as recited by the claims. Szeliski is directed to processing sprites which have no light reflectance information (Szeliski at Abstract, “(e.g., color and transparency) relating to the appearance of the sprite.”). The examiner has previously conceded this point in the most recent office action of the parent case at p. 3, ll. 6-8.

Further, Szeliski starts with a ***single*** source sprite and utilizes a depth parameter to render a destination sprite with a strong impression of three-dimensionality (Szeliski at c. 2, ll. 14-20). Therefore, Szeliski does not disclose or suggest a ***set of source radiance environment maps***, as recited by the claims.

Bastos does not cure the deficiencies of Szeliski. Bastos does not disclose or suggest a set of source radiance environment maps having ***pre-integrated total reflected radiance values***. While Bastos does some preprocessing to speed up the rendering process, Bastos still leaves the integration for rendering time (rather than using pre-integrated total reflected radiance values). This can be seen most clearly in Bastos at Figure 3. As shown in Bastos Figure 3, Bastos pre-computes (*not pre-integrates*) several items: Radiance Maps with Depth, K - Kernel Texture, and R - Reflectance Texture.

Radiance Maps with Depth are “precomputed [*not pre-integrated*] by sampling over the hemisphere of possible reflected view directions” (Bastos at 4. Overview, lines 21-23). K – Kernel Texture is “the kernel texture extracted [*not pre-integrated*] from the material’s BRDF” (Bastos at 6. Rendering Pipeline, lines 11-12). R – Reflectance Texture is “the reflectance modulation texture also deduced [*not pre-integrated*] from the material’s BRDF” (Bastos at 6. Rendering Pipeline, lines 12-13). Therefore, Bastos does not pre-integrate any values, let alone total reflected radiance values, as recited by the claims. As such, Bastos must still perform a convolution (which includes an integration) at runtime (Bastos Figure 3, Convolution block under Runtime).

Accordingly, applicant submits that the cited references, either taken alone or in combination, do not disclose or suggest the features of independent claims 15, 32, and 49.

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Additionally, inasmuch as dependent claims 16-31, 33-48, and 50-67 (which have also been rejected) are dependent from claim 15, 32, or 49, these claims are patentable over the cited references, at least by virtue of their dependency. Accordingly, applicant respectfully requests reconsideration and withdrawal of the rejections of and objections to claims 15-67 under 35 U.S.C. § 103(a).

New Claims

Claims 68-70 have been added to further define aspects of the invention.

Conclusion

For all the foregoing reasons, applicant respectfully submits that the application is now in condition for allowance. Reconsideration of the office action and an early notice of allowance are respectfully requested. In the event that the examiner cannot allow the present application for any reason, the examiner is encouraged to contact the undersigned attorney, Raymond N. Scott Jr. at (215) 564-8951, to discuss resolution of any remaining issues.

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